(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199206 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. II) THEORY EXAMINATION 2013-14

ENGINEERING PHYSICS –II

Time : 2 Hours *Total Marks : 50*

Note :– Attempt **all** Sections.

SECTION—A

1. Attempt **all** parts. All parts carry equal marks. **(2×5=10)**

   (a) What are de-Broglie's matter waves ?

   (b) What do you mean by Compton shift ?

   (c) What is Ferroelectricity ?

   (d) What is Poynting vector ?

   (e) Explain Meissner effect.

SECTION—B

2. Attempt any **three** parts of the following : **(3×5=15)**

   (a) Calculate the wavelength of an electron that has been accelerated in a particle accelerator through a potential difference of 100 Volts.

   (b) A beam of gamma radiation having photon energy 510 keV is incident on an aluminum foil. Calculate the wavelength of scattered radiation at 90°.

(c) If an *NaCl* crystal is subjected to an electric field of 1500 V/m and the resulting polarization is 4.3×10^{-8} C/m^2, calculate the relative permittivity of *NaCl*.

(d) If the upper atmospheric layer of earth receives 1360 W m^{-2} energy from the sun, what will be the peak values of electric and magnetic fields at the layer ?

(e) A superconducting Lead has a critical temperature of 6.2 K at zero magnetic fields and a critical field of 0.0306 Tesla at 0 K. Determine the critical field at 3.1 K.

SECTION—C (5×5=25)

Note :– Attempt **all** the questions of this Section. All questions carry equal marks.

3. Attempt any **one** part of the following : **(1×5=5)**

(a) Give a brief description of Davission and Germer experiment.

(b) What is Heisengberg's uncertainty principle ? Give its physical significance.

4. Attempt any **one** part of the following : **(1×5=5)**

(a) Derive time independent Schröndinger wave equation for a particle.

(b) Derive an expression for Compton shift showing dependency on angle of scattering.

5. Attempt any **one** part of the following : **(1×5=5)**

(a) Explain briefly, the different types of polarization in dielectrics.

(b) What do you mean by hysteresis loss ? Show that it is equal to the area of the hysteresis curve.

6. Attempt any **one** part of the following : **(1×5=5)**

(a) Explain the concept of displacement current. How does it makes the Ampere's law valid for non steady state ?

(b) Write down the Maxwell equations in free space and use these equations to derive wave equations.

7. Attempt any **one** part of the following : **(1×5=5)**

(a) What are superconductors ? Explain their classifications as type I and type II superconductors.

(b) What are nano science and nano technology ?

Physical Constants :

Speed of Light	$c = 3.0\times10^{8}$ m/s
Planck's constant	$h = 6.62\times10^{-34}$ J-s
Mass of electron	$m = 9.1\times10^{-31}$ kg
Permeability	$\mu_0 = 4\pi\times10^{-7}$ H/m
Permittivity	$\varepsilon_0 = 8.854\times10^{-12}$ F/m